Xerox PARC and the Speculative Nature of Technological Advancement

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In their article, "The Coming Age of Calm Technology," Mark Weiser and John Seely Brown attempted to look at the future of computing by taking stock of the rapid advancements in communication technology happening in 1996 and extrapolating that between 2005 and 2020 we would enter an age of "ubiquitous computing." [1] Seeing a progression from what they deem the "Mainframe Era," where many individuals shared one machine, to the "PC Era," characterized by the use of one machine by one individual, the upcoming "UC Era" would involve many machines communicating to one user as well as to each other. The overwhelming nature of such an arrangement would demand a form of "calm technology," which they saw as operating in the periphery of a user's attention rather than demanding constant focus.

From the vantage point of 2017, Weiser and Brown's assessment feels eerily prescient. Designers and technologists are still figuring out how to implement the ideas they generated. The authors were well positioned to see forward progress of technology from their affiliation with Xerox Palo Alto Research Center (PARC). Founded in 1970, the center was created as a secondary research laboratory for the Xerox corporation that could run with relative autonomy at a distance roughly 3,000 miles away from corporate headquarters in Rochester, NY.

To recount the list of accomplishments of Xerox PARC is to run through the "greatest hits" of early personal computing. The center has been credited for the development of (inexhaustibly and in no particular order): the laser printer, computer-generated bitmap graphics, the graphical user interface (GUI) operated by mouse, WYSIWYG word processing, ethernet, object-oriented programming, electronic paper, and the PDF file format. While similar in ways to academic research centers of the same era, including departments at MIT and Carnegie Mellon working in computer science and interface development, Xerox PARC found itself untethered to the demands of government (military) work that funded those operations. As John Bauer, who worked at PARC from 1970-2001, would later recall:

1. Mark Weiser and John Seely Brown, "The Coming Age of Calm Technology" (Palo Alto: Xerox PARC, 1996).

> "Conducting research at PARC four decades ago was like magic. In an era of political and social upheaval, we came to work every day with a passion to free technology from the grip of the military-industrial complex and bring computation to the people." [2]

While Xerox PARC's plethora of innovations and inventions is staggering and widely recognized, the center has also been widely criticized for failing to properly capitalize on them. While it tried to introduce products such as the Xerox Star to market in 1981, only 25,000 units were sold and the project was deemed a financial failure. [3] Other inventions were never introduced to market. The only successful translation from laboratory development to consumer product was the introduction of laser printers in the early 1980s, which grew to be a core component of Xerox's business model with billions in profits.

Postmortems of Xerox PARC's work the 1970s and early 1980s, which can be considered the most fruitful period of innovation for the center (under the leadership of Bob Taylor, who managed from its founding until 1983) [4], zero in on Steve Jobs' visit in 1979. In exchange for one hundred thousand shares in his company (sold at a million dollars), Jobs was allowed to tour the labs and see technology that had previously been unreleased. Specifically, he was given a chance to see the Xerox Alto, a personal computer developed for internal use at Xerox and the first to use a GUI with a mouse-based interface. According to legend, Jobs was so excited by these developments that he brought them back to Apple, and with the help of Dean Hovey (IDEO) created a mouse and GUI-based computer that could be brought to market. These advances were integrated into the Apple Lisa, released in 1982, and the original Macintosh, released in 1984, which became a bestseller for the company. [5]

It's easy to see how this narrative became the legend of Xerox PARC: it has the irony of a greek tragedy, a dash of corporate espionage, and a tie-in with the cult of celebrity that Jobs cultivated as diligently as he wore turtlenecks. Of course writers and journalists would repeat it until it became accepted wisdom. What is perhaps surprising is that Xerox itself bought into this vision of failure. In 2002, it spun the center off from the parent company, seeing it as a drain of resources, and the newly branded simply 'PARC' was pivoted toward a business model of profitability

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2. Todd R. Weiss, "Xerox PARC turns 40: Marking four decades of tech innovations." *Computer World*, September 20, 2010.
https://www.computerworld.com/article/2515846/computer-hardware/xerox-parc-turns-40--marking-four-decades-of-tech-innovations.html

3. Matthew DeCarlo, "Xerox PARC: A Nod to the Minds Behind the GUI, Ethernet, Laser Printing, and More." *Techspot*, October 20, 2016.
https://www.techspot.com/guides/477-xerox-parc-tech-contributions/

through licensing technologies to outside partners.

Is profitability the best way to measure the success or failure of a project like Xerox PARC? If so, the usefulness of laser printing technology to the parent company could hardly be ignored in the larger picture. The center easily recouped its operating losses through this invention alone.

A broader question therefore arises: to what extent can or should wide-reaching technological innovation be tied directly to the market? The argument could be made that the very nature of the enterprise required a separation from the profit-driven quarterly cycles of the corporate world. Indeed, Alan Kay, who worked at PARC in its earliest years before moving on to Apple, Microsoft, and numerous other companies, has said as much:

> "One of the keys to this kind of thing working is having a community. Xerox PARC and CDG are like collective MacArthur grants. You're not funding individuals, you're putting together a community. You're trying to create an environment, a world. Not a thing. We never discussed what our ultimate goal was at PARC. It didn't look like we were doing anything for the first couple years, and Xerox was upset… The rule is, if you put together an artist's colony and fund it, you're going to get art." [6]

Are the dictates of capitalism our only way to assess worth? Kay's analogy here to an artist's colony is telling, as the arts could be considered as a primary example of a sphere operating outside of the ordinary dictates of capitalism. Perhaps artistic research could be a better paradigm for considering the process of technological innovation that was happening in PARC's golden years. The process of posing questions and identifying problems, and coming up with solutions without regard to questions of practicality for the market has a conceptual bent to it that matches up nicely with the artist's practice.

Which leads back to the origin of the inquiry. In explaining their vision of ubiquitous computing and its demand for new forms of calm technology, Weiser and Brown find its ultimate embodiment not in a current or speculative products, but rather in a piece of installation art. Natalie Jeremijenko's "Dangling String" was installed in Xerox PARC's offices, possibly as a part of the PAIR

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4. https://en.wikipedia.org/wiki/PARC_(company)

5. Malcolm Gladwell, "Creation Myth." *New Yorker*, May 16, 2011.
https://www.newyorker.com/magazine/2011/05/16/creation-myth

6. John Pavlus, "5 Steps to Re-create Xerox PARC's Design Magic (From The Guy Who Helped Make It)." *Fast Company*, May 26, 2015.
https://www.fastcodesign.com/3046437/5-steps-to-recreate-xerox-parcs-design-magic-from-the-guy-who-helped-make-it

(PARC Artist-in-Residence) program. With the casual nature of a studio experiment, "Dangling String" seems an unlikely source of inspiration for Weiser and Brown. By viewing PARC's work through the lens of artistic research, however, we can understand that Jeremijenko's work was not dissimilar from that happening in the lab—both her project and the article itself stand as attempts to grapple with new technology in novel ways. Both stand as speculative and distinctly non-commercial work—in what context could any of it be bought or sold, or directly incorporated into a business plan? Yet as a totality, the conceptual output still has relevance over twenty years later. It is this cultural, social, and technological relevance that seems the best way of considering PARC's legacy, regardless of questions of business savvy.